

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

|                                |   |                                    |                          |
|--------------------------------|---|------------------------------------|--------------------------|
| In re Application of:          | § | Serial No:                         | To Be Assigned           |
| Richard E. Smalley et al.      | § |                                    | (division of application |
|                                | § |                                    | Serial No. 09/380,545)   |
| For: CARBON FIBERS FORMED FROM | § |                                    |                          |
| SINGLE-WALL CARBON             | § | Filed: CONCURRENTLY HEREWITH       |                          |
| NANOTUBES                      | § |                                    |                          |
|                                | § | Group Art Unit: 1754 (anticipated) |                          |
|                                | § |                                    |                          |
| Atty Dkt: 11321-P012USD6       | § | Prior Examiner: Stuart Henderson   |                          |
|                                | § | 703.308.2539                       |                          |

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| <u>December 28, 2001</u>   | <u></u> |
| Date   | Signature  |
|  | <u>Gracie Segovia</u>  |
|  | Printed Name   |

**PRELIMINARY AMENDMENT ACCOMPANYING REQUEST FOR FILING  
DIVISIONAL APPLICATION UNDER 37 C.F.R. § 1.53(b)**

Sir:

This paper accompanies a Request for Filing Divisional Application Under 37 C.F.R. § 1.53(b) and associated filing fee therefor ("the Request"). If the fee payment is missing or insufficient in amount, or if any other fees are determined to be due, the Assistant Commissioner, Commissioner, and/or the Director of the U.S. Patent & Trademark Office is/are hereby authorized to charge any such fees (or credit any overpayment) to Winstead Sechrest & Minick Deposit Account No. 23-2426, referencing matter number 11321-P012USD6.

IN RE: APPLICATION OF SMALLEY ET AL.  
PRELIMINARY AMENDMENT ACCOMPANYING REQUEST FOR FILING DIVISIONAL APPLICATION UNDER  
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## AMENDMENTS

### In the Title

Please amend the title by replacing the present title with the following:

--METHOD FOR FORMING COMPOSITES OF SUB-ARRAYS OF SINGLE-WALL  
CARBON NANOTUBES--

### In the Abstract

Please amend the abstract by replacing the present abstract with the following:

--This invention relates generally to forming arrays of single-wall carbon nanotubes (SWNT). In one embodiment, the present invention involves forming a macroscopic molecular array of tubular carbon molecules, said method comprising the step of assembling subarrays of up to  $10^6$  single-wall carbon nanotubes into a composite array.--

### In the Specification

Please amend the specification as noted on page 5, paragraph 11 of the Request by inserting before the first line of the specification the following:

### --RELATED APPLICATIONS

This application is a division of co-pending prior U.S. patent application Serial No. 09/380,545, filed on September 3, 1999, entitled "CARBON FIBERS FORMED FROM SINGLE-WALL CARBON NANOTUBES," which is the 35 U.S.C. § 371 national application of International Application Number PCT/US98/04513 filed on March 6, 1998, which designated the United States, claiming priority to: provisional U.S. patent application Serial Number 60/067,325, filed on December 5, 1997; provisional U.S. patent application Serial Number 60/064,531, filed on November 5, 1997; provisional U.S. patent application Serial Number 60/063,675, filed on October 29, 1997; provisional U.S. patent application Serial Number 60/055,037, filed on August 8, 1997; provisional U.S. patent application Serial Number

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60/047,854, filed on May 29, 1997; and provisional U.S. patent application Serial Number 60/040,152, filed on March 7, 1997. Each of the foregoing applications is commonly assigned to the assignee of the present invention and is hereby incorporated herein by reference in its entirety.

This application discloses subject matter related to the subject matter of U.S. patent application Serial Number 10/000,746, filed on November 30, 2001 in the name of Daniel T. Colbert et al., entitled "MACROSCOPICALLY MANIPULABLE NANOSCALE DEVICES MADE FROM NANOTUBE ASSEMBLIES," which application is commonly assigned to the assignee of the present invention.--

### In the Claims

Please amend the claims as follows:

A. Please cancel claims 1-37 and 42-162 without prejudice or disclaimer to the subject matter thereof.

B. Please amend claim 41 as follows:

41. (Amended) The method of claim 38 wherein the subarrays are made according to the method comprising:

- (a) providing at least about  $10^6$  tubular carbon molecules of substantially similar length in the range between 50 to 500 nm;
- (b) introducing a linking moiety onto at least one end of the tubular carbon molecules;
- (c) providing a substrate coated with a material to which the linking moiety will attach; and
- (d) contacting the tubular carbon molecules containing a linking moiety with the substrate.

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C. Please add the following new claims 163-168:

163. (New) The method of claim 41 wherein the substrate comprises a substance selected from the group consisting of gold, mercury and indium-tin-oxide.

164. (New) The method of claim 41 wherein the linking moiety comprises a moiety selected from the group consisting of -S-, -S-(CH<sub>2</sub>)<sub>n</sub>-NH-, and -SiO<sub>3</sub>(CH<sub>2</sub>)<sub>3</sub>NH-.

165. (New) The method of claim 38 wherein the subarrays are made according to the method comprising:

- (a) providing a nanoscale array of microwells on a substrate;
- (b) depositing a metal catalyst in each of said microwells; and
- (c) directing a stream of hydrocarbon or CO feedstock gas at said substrate under conditions that effect growth of single-wall carbon nanotubes from each microwell.

166. (New) The method of claim 165 further comprising applying an electric field when growing the single-wall carbon nanotubes.

167. (New) The method of claim 38 wherein the subarrays are made according to the method comprising:

- (a) providing a surface comprising purified single-wall carbon nanotube material;
- (b) subjecting the surface to oxidizing conditions sufficient to cause short lengths of broken single-wall carbon nanotubes to protrude up from the surface; and
- (c) applying an electric field to the surface to cause the single-wall carbon nanotubes to align in an orientation generally perpendicular to the surface and coalesce into an array.

168. (New) The method of claim 167 wherein the oxidizing conditions comprise heating the surface to about 500°C in an atmosphere of oxygen and CO<sub>2</sub>.

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### REMARKS

A. *Status of the Application.* On September 3, 1999, Applicant filed the parent patent application, U.S. patent application Serial No. 09/380,545, which included originally filed claims 1-162. In an Office Action, dated June 20, 2000, ("the Office Action") the Examiner subjected the claims to a restriction requirement. According to the Office Action, the parent patent application's claims were directed to eleven (11) distinct inventions. Applicant elected the invention of Group VIII in the parent patent application. The present divisional application is directed to the invention of Group VI, which were identified as the invention claimed by originally filed claims 38-41.

Accordingly, originally filed claims 38-41 remain in the application, and the other originally filed claims -- claims 1-37 and 42-162 -- are cancelled herein without prejudice or disclaimer to the subject matter thereof. Additionally, claims 163-168 have also been added herein. No new matter is added by the addition of these claims.

B. *Amended Claim.* Claim 41 is amended herein. The Applicant respectfully asserts that the amendment to claim 41, and incorporated by reference in any claims depending therefrom, are not narrowing amendments made for a reason related to the statutory requirements for a patent that will give rise to prosecution history estoppel. *See Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 234 F.3d 555, 566, 56 U.S.P.Q.2d 1865, 1870 (Fed. Cir. 2001).

Attached hereto is a marked-up version of the changes made to claim 41 by the current amendment. The attached page is captioned "Version with Markings to Show Changes Made."

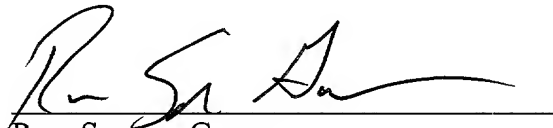
### CONCLUSION

It is believed that each of the claims now pending in the present application recites elements neither taught nor suggested by the prior art. Further, it is believed that the application as a whole is in proper form and condition for allowance. If the Examiner believes that the application may be placed in even better condition for allowance, he or she is invited to contact the undersigned at the telephone number noted below. Alternatively, or in addition, if the

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Examiner believes that an Examiner interview would be beneficial, the Examiner is invited to note that the undersigned has ready access to the videoconferencing facilities of the South Central Intellectual Property Partnership at Rice University in Houston, Texas. The inventors and the undersigned would welcome the opportunity to use those facilities to clarify any issues deemed to remain unresolved.

Respectfully submitted,



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Date: December 28, 2001

ATTORNEYS FOR ASSIGNEE

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**Version with Markings to Show Changes Made**

41. (Amended) The method of claim 38 wherein the subarrays are made according to the method [of any of claims 31, 34 or 36] comprising:

- (d) providing at least about  $10^6$  tubular carbon molecules of substantially similar length in the range between 50 to 500 nm;
- (e) introducing a linking moiety onto at least one end of the tubular carbon molecules;
- (f) providing a substrate coated with a material to which the linking moiety will attach; and
- (d) contacting the tubular carbon molecules containing a linking moiety with the substrate.

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12/28/2001 - 11321-P012USD6